

MORPHOMETRIC STUDY OF FISH CAUGHT IN POCKET DRAG NETS (JTB) OF FISHERMEN AT TPI NUSANTARA BRONDONG FISHERY HARBOR, LAMONGAN

Kajian Morfometrik Ikan Hasil Tangkapan Jaring Tarik Berkantong (JTB) Nelayan di TPI Pelabuhan Perikanan Nusantara Brondong, Lamongan

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(Received June 30th 2026; Accepted August 11th 2026)

ABSTRACT

Brondong Nusantara Fishing Port (NFP) is a type B port located in Indonesia. Brondong NFP, with its adequate facilities, has become the economic center for the fishing community engaged in fishing activities using cantrang nets or Pocket Seines (JTB). In accordance with the Minister of Maritime Affairs and Fisheries Regulation Number 18 of 2021 concerning the Placement of Fishing Gear and Fishing Aids, the prohibited mesh size for cantrang nets is less than 2 inches (5 cm), so it is replaced with a Pocket Trawl Net with a minimum mesh size of 2 inches. Fish have body parts that can be measured and counted. The measurement referred to is morphometric measurement. This morphometric measurement can be used to determine fish growth patterns, feeding habits, fish classification, and as a basis for identifying fish that are catchable and those that are not yet catchable. This research was conducted with the aim of determining the morphometric characteristics of catches from vessels using the Pocket Seines (JTB) by fishermen at PPN Brondong. The method used in this study is a quantitative method conducted at the TPI PPN Brondong by performing morphometric measurements of fish. Measurements were conducted by assessing 8 morphometric characters of the catch from 5 JTB boats. The results of this study indicate that the JTB fishing gear used by fishermen at PPN Brondong does not comply with the regulations on permissible fishing gear based on PERMENKP No. 18 of 2021. The allowed mesh size for operation is 5 cm or 2 inches, while the minimum width of the fish body is 3 cm or 1.1 inches, which the fishermen catch and can impact the sustainability of fish populations.

Keywords: Brondong NFP, Pocket Trawl Net (JTB), Catch Results, Morphometric

ABSTRAK

Pelabuhan Perikanan Nusantara (PPN) Brondong merupakan pelabuhan tipe B yang ada di Indonesia. PPN Brondong dengan fasilitas memadai menjadi pusat perekonomian masyarakat nelayan yang melakukan kegiatan penangkapan menggunakan alat tangkap cantrang atau Jaring Tarik Berkantong (JTB). Sesuai dengan Peraturan Menteri Kelautan dan Perikanan Nomor 18 tahun 2021 tentang Penempatan Alat Penangkapan Ikan dan Alat Bantu Penangkapan Ikan, ukuran mata jaring cantrang yang dilarang adalah kurang dari 2 inci (5 cm) sehingga digantikan dengan Jaring Tarik Berkantong dengan ukuran mata jaring minimal 2 inci. Ikan memiliki bagian tubuh yang dapat diukur dan dihitung. Pengukuran yang dimaksud adalah pengukuran morfometrik. Pengukuran morfometrik ini dapat digunakan untuk mengetahui pola pertumbuhan ikan, kebiasaan makan ikan, golongan ikan, dan sebagai dasar dalam melakukan identifikasi ikan yang sudah layak tangkap dan belum layak tangkap. Penelitian ini dilakukan dengan tujuan untuk mengetahui karakteristik morfometrik hasil tangkapan kapal dengan alat tangkap Jaring Tarik Berkantong (JTB) oleh nelayan di PPN Brondong. Metode yang digunakan dalam penelitian ini yaitu metode kuantitatif yang dilakukan di TPI PPN Brondong dengan melakukan pengukuran morfometrik ikan. Pengukuran dilakukan dengan menilai 8 karakter morfometrik dari tangkapan di 5 kapal JTB. Hasil dari penelitian ini didapatkan bahwa alat tangkap JTB yang digunakan oleh nelayan di PPN Brondong tidak sesuai dengan ketentuan alat tangkap yang boleh beroperasi berdasarkan peraturan PERMENKP No. 18 Tahun 2021. Ukuran mata jaring yang di izinkan beroperasi yaitu 5cm atau 2inci sedangkan ukuran lebar badan ikan terkecil 3 cm atau 1,1 inci yang didapatkan nelayan yang dapat berdampak pada kerlanjutan populasi ikan.

Kata kunci: Brondong NFP, Pocket Trawl Net (JTB), Catch Results, Morphometric

INTRODUCTION

According to the Fisheries Law (Law No. 45 of 2009), a fishing port is an area comprising both land and water—within defined boundaries—that serves as a site for government administration and commercial fisheries activities. Fishing ports function as locations where fishing vessels dock, anchor, and unload their catches. Furthermore, these ports are equipped with various facilities that support fishery operations. Fishing ports are classified into four categories: Type A (Ocean Fishing Port/PPS), Type B (Archipelagic Fishing Port/PPN), Type C (Coastal Fishing Port/PPP), and Type D (Fish Landing Base/PPI) (Puspitasari *et al.*, 2016).

Brondong Archipelagic Fishing Port (PPN Brondong) is a Type B port located in Indonesia. Fishing ports play a crucial role in enhancing fisheries infrastructure and are an integral part of the capture fisheries system. PPN Brondong possesses comprehensive port facilities—including both basic and functional amenities—that greatly assist fishermen in managing their catches (Alfiana *et al.*, 2018). PPN Brondong serves as an economic hub for fishing communities from the Brondong, Blimbing, Kandang Semangkong, and Palang areas (Sinaga & Wijayanto, 2014).

PPN Brondong acts as a center for fishing activities conducted by fishermen who employ various types of fishing gear, including cantrang or Jaring Tarik Berkantong (JTB)—a type of Danish seine or boat seine net (Nugraha *et al.*, 2019). In accordance with the Regulation of the Minister of Marine Affairs and Fisheries Number 18 of 2021 concerning the Placement of Fishing Gear and Fishing Aids, the use of cantrang nets with a mesh size of less than 2 inches (5 cm) is prohibited; consequently, they have been replaced by Jaring Tarik Berkantong (bagged seine nets) with a minimum mesh size of 2 inches. The cantrang or JTB gear resembles a large, cone-shaped bag that tapers toward the rear. It is a type of fishing gear operated on the seabed, targeting demersal fish (Aji *et al.*, 2013). The use of environmentally friendly and selective fishing gear supports sustainable fisheries management by minimizing impacts on

fish populations and preventing the capture of fish that have not yet reached a harvestable size (Zahara *et al.*, 2023). Information regarding the composition of the catch is crucial for establishing a sound basis for sustainable fisheries management. This information can be applied across various aspects—ranging from harvest management, product handling, processing, and marketing to improving fish quality in the markets of coastal fishing communities (Katarina *et al.*, 2019).

Fish possess body parts that can be measured and quantified (Akmal *et al.*, 2018); specifically, morphometric measurements are used. These measurements help determine growth patterns, feeding habits, and fish classification, and serve as a basis for distinguishing between fish that are ready for harvest and those that are not (Bhagawati *et al.*, 2013). This study aims to determine the morphometric characteristics of catches obtained using Jaring Tarik Berkantong (JTB) gear by fishermen at the Brondong Archipelago Fishing Port (PPN Brondong).

RESEARCH METHODS

This study was conducted at the Brondong Nusantara Fishing Port, Lamongan, from September 17 to November 26, 2024. Catch data were collected from five different vessels: KMN Andi Saputra, KM Malda Jaya, KM Panca Marga, KM Anugrah 2, and KM Wahyu Illahi. Morphometric measurements were performed after the vessels had docked at the port; a single specimen of each catch type was selected for measurement.

Morphometric measurements involved the use of a measuring board and ruler for length, and a scale for weight. These measurements were carried out to obtain data supporting the study. Such measurements help determine fish growth patterns, feeding habits, and classification, and serve as a basis for species identification. Commonly measured morphometric characters include total length (TL), standard length (SL), tail length (TaL), body depth or width (BD), fin height (FH), fin length or width (FL), and eye diameter (ED) (Bhagawati *et al.*, 2013).

Data analysis was conducted using a descriptive-quantitative approach based on morphometric measurements—specifically total length (TL), standard length (SL), tail length (TaL), body depth (BD), fin height (FH), fin length or width (FL), eye diameter (ED), and body weight. Descriptive statistics were applied to the measurement data by calculating minimum and maximum values, means, and size distributions for each parameter to characterize the size variation of the captured fish. Furthermore, the length-size distribution data served as a basis for evaluating whether the catch sizes met the criteria for harvestable size, based on references regarding sexual maturity or applicable fisheries resource management standards. This analysis aims to determine the size characteristics of the fish catch population, identify the dominance of specific size classes, and provide an overview of the state of fish resource utilization based on the catch size structure. The results of the morphometric analysis also serve as supporting information for examining growth patterns, biological characteristics, and the sustainability of the utilization of the fish species under study. Table 1 lists the morphometric characteristics measured at the study site.

Table 1. Notation, Name, and Description of Measured Fish Morphometric Characteristics

No	Notation	Character Name	Description
1	PT	Total length	Straight-line distance from the front edge of the head to the rear edge of the caudal fin.
2	PS	Standard length	The straight line distance from the tip of the head to the base of the tail fin

3	PE	Tail length	The distance from the tip of the dorsal fin to the base of the tail.
4	LB	Body width	The widest horizontal distance across the fish's body.
5	TS	Fin height	The greatest distance between the tip of the dorsal fin and the base of the dorsal fin.
6	LS	Fin length	Distance from the anterior dorsal fin to the tip of the posterior dorsal fin.
7	LK	Head Width	the maximum horizontal distance between the left and right sides of the fish's head.
8	DM	Eye diameter	The diameter of the eyeball is half the height of the orbit.

RESULT

Based on the identification of catch species presented in the table, 16 fish species belonging to 15 families were recorded: Priacanthidae, Nemipteridae, Lutjanidae, Carangidae, Epinephelidae, Balistidae, Sphyraenidae, Leiognathidae, Synodontidae, Mullidae, Monacanthidae, Dasyatidae, Haemulidae, and Gerreidae. This species composition indicates a relatively high level of diversity in the study area's catch, reflecting the multispecies nature characteristic of tropical capture fisheries. Several of the identified species are economically important, such as *Priacanthus tayenus* (bigeye), *Nemipterus virgatus* (threadfin bream), *Lutjanus vitta* (brownstripe red snapper), *Lutjanus sp.* (red snapper), *Epinephelus sexfasciatus* (sixbar grouper), *Selar boops* (oxeye scad), and *Parastromateus niger* (black pomfret), all of which command high market value. The dominance of families such as Lutjanidae, Nemipteridae, Priacanthidae, and Mullidae suggests that the fishing grounds possess habitat characteristics favorable to demersal fish and species associated with environments ranging from coastal waters to shallow continental shelves. Furthermore, the presence of other species—such as *Sphyraena forsteri* (bigeye barracuda), *Dasyatis kuhlii* (blue-spotted stingray), and *Plectorhinchus flavomaculatus* (goldspotted sweetlips)—demonstrates that the fishing gear employed captures a variety of fish groups with distinct ecological characteristics. This diverse species composition provides crucial information for catch analysis, as it illustrates the structure of the captured fish community and serves as a foundation for further analysis using morphometric data to examine size variations, length-weight distributions, and biological characteristics of the fish caught at the study site.

Table 2. Dominant Catch Species at PPN Brondong

No	Local Name	Latin name	Famili
1	Bigeye snapper	<i>Priacanthus tayenus</i>	Priacanthidae
2	Threadfin bream	<i>Nemipterus virgatus</i>	Nemipteridae
3	Yellow goatfish	<i>Lutjanus vitta</i>	Lutjanidae
4	Red snapper	<i>Lutjanus sp.</i>	Lutjanidae
5	Yellowstripe Scad	<i>Selar boops</i>	Carangidae
6	Spotted grouper	<i>Epinephelus sexfasciatus</i>	Epinephelidae
7	Leatherjacket fish	<i>Pseudobalistes fuscus</i>	Balistidae
8	Barracuda	<i>Sphyraena forsteri</i>	Sphyraenidae
9	Slipmouth fish	<i>Aurigequula fasciata</i>	Leiognathidae
10	Flathead Goby	<i>Saurida micropectoralis</i>	Synodontidae
11	Yellow goatfish	<i>Upeneus moluccensis</i>	Mullidae

12	Leatherjacket fish	<i>Aluterus monoceros</i>	Monacanthidae
13	Black pomfret	<i>Parastromateus niger</i>	Carangidae
14	Honeycomb stingray	<i>Dasyatis kuhlii</i>	Dasyatidae
15	Sweetlips	<i>Plectorhinchus flavomaculatus</i>	Haemulidae
16	Spotted Scat	<i>Gerres filamentosus</i>	Gerreidae

Tables 3 through 7 present the morphometric measurement results of the catch, categorized by vessel type. Based on measurements taken from five sample vessels—KM. Andi Saputra, KM. Malda Jaya, KM. Panca Marga, KM. Anugrah 2, and KM. Wahyu Illahi—variations were observed in the morphological dimensions of the catch, including total length (TL), standard length (SL), tail length (TaL), body width (BW), fin height (FH), fin length (FL), head circumference (HC), eye diameter (ED), and body weight (W). The results indicate differences in size characteristics across species, influenced by biological factors such as fish type, age, growth rate, and habitat conditions. The data reveal that the largest specimens belonged to the ray group, with a total length of 46 cm and a weight of 0.435 kg, whereas the smallest specimens were scad, with a total length of approximately 14 cm and a weight of around 0.115 kg. Commercially important fish groups—such as grouper, snapper, threadfin bream, and bigeye snapper—exhibited variations in length and weight across vessels, indicating differences in the size composition of fish populations caught at different locations or times. Morphometric measurements such as total length, standard length, and weight are crucial parameters in fisheries biology studies, as they serve to describe population size structure, growth patterns, and the biological characteristics of a species (Froese, 2006; Le Cren, 1951). Furthermore, the relationship between fish length and weight can provide insights into growth conditions and the well-being of fish populations through length-weight relationship analysis. The variation in morphometric values obtained in this study indicates that the fishery catch at PPN Brondong exhibits multispecies characteristics with diverse size structures; consequently, these data can serve as a basis for evaluating catch composition and fish biological characteristics, as well as supporting sustainable fish resource management (Sitanggang *et al.*, 2025). The use of morphometric traits as an approach for fish population identification and analysis is also widely applied, as it provides information regarding differences in body size, shape, and population variation within a given aquatic area.

Table 3. Morphometric measurement results for KMN Andi Saputra.

No	Name	PT	PS	PE	LB	TS	LS	LK	DM	B (g)
1	Bigeye	16,5	13	3,5	4,5	2	6	3,5	1,5	0,305
	Snapper									0,340
	Threadfin									
2	Bream	19	14	4,5	4	1	6,5	4	1	
3	Pomfret	20	13	5	12	9,5	9	5	1	0,450
4	Snapper	22	17	5	6,5	2	8,5	4,5	1	0,230
5	Grouper	24	17	7	5	2,5	9	4	1,2	0,420
6	Leatherjacket	22	16	6	7	1,5	6	6	1	0,310
	fish									0,320
7	Sweetlips	25	17	8	7,5	2,5	11	5	1	
8	Yellowstripe	17	12	5	4	1,5	5	2,5	0,9	0,120
	Scad									0,350
9	Flathead	28	23	5	4	4	3	2,5	0,5	
	Goby									

10	Slipmouth fish	21	16	5	7	2,3	7	4	0,9	0,210
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Table 4. Morphometric measurement results for KM Malda Jaya.

No	Name	PT	PS	PE	LB	TS	LS	LK	DM	B (g)
1	Bigeye Snappe Threadfin	20	12	3	4,5	2	7	4	2	0,320
2	Bream Yellow goatfish	24	17	3	6,5	2	10	5	1	0,380
3	goatfish	18	14	2,5	5	1	7	3,5	1	0,125
4	Snapper	17	13	3	7,5	1,5	8	5	1	0,150
5	Grouper	28	22	5	7	2,5	13	5	1	0,470
6	Barracuda	27	23	3	3	1,5	4	2,5	1	0,230
7	Leatherjacket fish	30	21	6	11,5	4	8	6	1,5	0,540
8	Yellowstripe Scad	14	11,5	2	4	1,5	6	2,5	0,5	0,115
9	Flathead Goby	33	28	4	4	5	4	2	0,8	0,355
10	Slipmouth fish	18	13,5	4	7	1,5	7	4,5	1	0,125

Table 5. Morphometric measurement results for KM Panca Marga

NO	Name	PT	PS	PE	LB	TS	LS	LK	DM	B (g)
1	Bigeye Snappe Threadfin	23	15	8	6	2	9	4	2	0,320
2	Bream Yellow goatfish	20	15	5	5	2,5	6,5	3,5	0,9	0,260
3	goatfish	19	15	4	4	2,5	5	3,5	1	0,165
4	Snapper	21	17	4	6,5	1,5	8,5	4	1	0,235
5	Grouper	24	19	5	6,5	2,3	11	4,5	1	0,415
6	Bukur/jaket	29	23	6	8	2	6	7	1	0,515
7	Leatherjacket fish	28	21	7	9,5	2	7,5	7	1,2	0,350
8	Yellowstripe Scad	22	16	6	5	2,5	6	3,5	2	0,175
9	Flathead Goby	27	23	4	3,8	4	4	2	0,8	0,325
10	Slipmouth fish	17	13	4	7	1,5	7	4,5	1	0,115

Table 6. Morphometric measurement results for KM Anugrah 2

NO	Name	PT	PS	PE	LB	TS	LS	LK	DM	B (g)
1	Bigeye Snappe Threadfin	20	12	3	4,5	2	7	4	2	0,350
2	Bream	20	15	5	5	2,5	6,5	3,5	0,9	0,320

	Yellow									0,175
3	goatfish	22	17	5	5,5	2,5	5	4	1	
4	Snapper	21	16	5	6,5	2	9	4,5	1	0,155
5	Grouper	27	21	4	6,5	2	12	5	1	0,375
6	Barracuda	27	23	3	3	1,5	4	2,5	1	0,230
7	Stingray	46	21	25	23	4	14	9	2	0,435
	Yellowstripe									0,115
8	Scad	14	11,5	2	4	1,5	6	2,5	0,5	
	Flathead									0,355
9	Goby	33	28	4	4	5	4	2	0,8	
	Leatherjacket									0,125
10	fish	18	13,5	4	7	1,5	7	4,5	1	

Table 7. Morphometric measurement results for KM Wahyu Illahi

NO	Name	PT	PS	PE	LB	TS	LS	LK	DM	B (g)
	Bigeye									0,335
1	Snappe	21	12	3	5,5	2	5	4	2	
	Threadfin									0,320
2	Bream	20	15	5	5	2,5	6,5	3,5	0,9	
	Yellow									0,145
3	goatfish	21	17	4	4,5	2,5	5	4	1	
4	Snapper	17	13	3	7,5	1,5	8	5	1	0,130
5	Grouper	27	21	4	6,5	2	12	5	1	0,450
	Yellow									0,135
6	goatfish	20	15	4,5	5	1,3	7	3,5	1	
	Leatherjacket									0,435
7	fish	28	21	7	9	2	7	7	1,2	
	Yellowstripe									0,115
8	Scad	14	11,5	2	4	1,5	6	2,5	0,5	
	Flathead									0,355
9	Goby	33	28	4	4	5	4	2	0,8	
	Leatherjacket									0,125
10	fish	18	13,5	4	7	1,5	7	4,5	1	

DISCUSSION

Based on morphometric measurements of five sample vessels—KM. Andi Saputra, KM. Malda Jaya, KM. Panca Marga, KM. Anugrah 2, and KM. Wahyu Illahi—variations in body size were observed across the different fish species caught. The parameters examined included total length (TL), standard length (SL), tail length (TaL), body width (BW), fin height (FH), fin length (FL), head circumference (HC), eye diameter (ED), and body weight (W). These size variations indicate differences in biological characteristics between species and among individuals within the same species. Morphometric measurement is a crucial approach in fisheries biology studies, as it characterizes body shape variations and population traits, while also supporting the identification and assessment of fish resource conditions (Zulfahmi *et al.*, 2021). In this study, the largest body size was observed in a stingray specimen from KM. Anugrah 2, which had a total length of 46 cm, a standard length of 21 cm, and a body width of 23 cm—reflecting a broader body shape compared to the other species. Conversely, the smallest sizes were found in scad (*Selar spp.*), with total lengths ranging from 14–17 cm and weights between 0.115–0.175 g across several vessels. These size differences indicate that the

catch comprises various size groups influenced by factors such as species, age, habitat, and aquatic environmental conditions (Wardani & Zainuri, 2023).

Comparisons between vessels revealed distinct variations in the size composition of the catch. On KM. Andi Saputra, the dominant fish size ranged from 16.5–28 cm in total length, with the largest specimen being a lizardfish (*Saurida micropectoralis*) measuring 28 cm in TL and weighing 0.350 g. KM. Catches by Malda Jaya showed relatively larger sizes for several species, particularly beloso (Total Length/TL: 33 cm) and ayam-ayam (TL: 30 cm; maximum weight: 0.540 kg). For KM. Panca Marga, the largest body size was observed in bukur/jaket (TL: 29 cm; weight: 0.515 kg), whereas KM. Anugrah 2 exhibited the greatest size variation, with a stingray measuring 46 cm in total length and 23 cm in width. Meanwhile, KM. Wahyu Illahi displayed size patterns relatively similar to the other vessels, with beloso again representing the largest size (TL: 33 cm; weight: 0.355 kg). Differences in catch sizes among these vessels may reflect variations in fishing grounds, operational depths, fishing seasons, and the selectivity of the gear employed by each vessel (Andrian and Suwarsih, 2021).

An analysis of the length-weight relationship reveals that longer fish tend to be heavier, although this pattern varies by species. For instance, groupers caught by KM. Malda Jaya were relatively large, with total lengths of 24–28 cm and weights reaching 0.470 kg, whereas threadfin bream reached a total length of 24 cm but had a lower weight of approximately 0.380 kg. This indicates that body shape and growth characteristics specific to each species influence the relationship between length and weight. Length-weight analysis is a crucial parameter in fisheries studies, as it provides insights into growth patterns, biological condition, and the health of fish populations (Froese, 2006). Differences in length-weight ratios among species can be influenced by genetic factors, body shape, food availability, environmental conditions, and the stage of gonadal maturity (Sitanggang, 2024).

Based on morphometric measurements of the catch from five pocketed drag net (JTB)—a type of pocketed seine net—vessels at PPN Brondong, variations in species and sizes were observed, indicating differences in the biological characteristics of the captured fish. These variations are likely linked to differences in fishing grounds, aquatic environmental conditions, food availability, and gear operational characteristics; however, as these factors were not comparatively analyzed in this study, they cannot be definitively identified as direct causes. Regarding gear specifications, the average mesh size across the five observed vessels was approximately 3 cm (1.1 inches), while the morphometric data served to characterize the catch based on body length and weight parameters. Consequently, the morphometric data did not serve as the direct basis for determining mesh size compliance but rather provided supporting information on the size structure of the catch. Evaluating gear compliance requires direct measurement of gear specifications—particularly mesh size—followed by a comparison with applicable regulations. Thus, while this study reveals variations in the size characteristics of JTB catches at PPN Brondong, assessing gear selectivity and compliance requires further investigation through an analysis of the relationship between mesh size and the size of the captured fish (Sitanggang *et al.*, 2024; Syafrialdi *et al.*, 2022).

Overall, morphometric measurements from the five vessels indicate that the catch at PPN Brondong is multispecies in nature and exhibits significant size variation. Economically important species—such as groupers, snappers, threadfin bream, goatfish, and bigeye snapper—showed size variations across vessels, reflecting differences in the population structure of the captured fish. This morphometric data provides baseline information on the biological condition of the catch and can be used to evaluate the size characteristics of landed fish. However, morphometric data does not directly determine catch quality; rather, it serves as a biological indicator supporting the analysis of size structure and fish resource utilization. Therefore, a combination of species composition data, morphometric measurements, and other

biological parameters is required to provide a more comprehensive overview of the capture fishery conditions at the study site (Sitanggang *et al.*, 2024).

CONCLUSION

Based on the research findings, it can be concluded that the catches from vessels using pocketed drag net (JTB)—a type of towed net with a codend—at PPN Brondong exhibit diverse morphometric characteristics and a multispecies composition. Measurements of morphometric parameters reveal variations in length, body size, and weight—both among fish species and across vessels—influenced by species-specific biological traits, aquatic environmental conditions, and fishing activities. These morphometric data provide an overview of the catch's size structure and can serve as baseline information for evaluating biological characteristics and managing fish resources sustainably.

ACKNOWLEDGEMENT

The author extends their gratitude to the Brondong National Fishing Port (PPN Brondong) in Lamongan for granting permission to conduct research at the PPN Brondong Fish Auction Center (TPI). The author also wishes to thank the team of lecturers from the Capture Fisheries study program for their support and assistance throughout the research process.

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